

## **Does Optimizing Asymmetric Native Knee Flexion Gap Balance Promote Superior Outcomes in Primary Total Knee Arthroplasty?**

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### **INTRODUCTION:**

Replicating native knee kinematics remains the ultimate goal of contemporary total knee arthroplasty (TKA). Advanced technology such as robotics and TKA sensors provide greater intraoperative information, without evidence-based targets for improved patient outcomes. Further, some surgeons target a rectangular flexion space in TKA unlike the native knee. This study purpose was to determine the effect of in vivo flexion gap asymmetry on PROMs in contemporary TKA.

**METHODS:** Tibiofemoral joint space dimensions were measured during 129 standardized TKAs by two surgeons using a calibrated tension device at 90-degrees of flexion after complete PCL-resection. Flexion space asymmetry was calculated. Patient-reported outcomes at minimum 1-year related to pain, function, and satisfaction were compared in patients categorized in groups based on gap dimensions at 90-degrees of flexion: 1) equivalent laxity in medial and lateral compartments, 2) greater lateral laxity, and 3) greater medial laxity.

**RESULTS:** The three groups did not differ by age, BMI, gender proportions ( $p \geq 0.429$ ), months of latest follow up ( $p = 0.134$ ), preoperative tibiofemoral alignment ( $p = 0.498$ ), or preoperative PROM scores ( $p \geq 0.093$ ). Knee Society Score (KSS) pain with stair climbing and a knee "always" feeling normal were significantly superior (exceeding MCID) for patients with equal or lateral laxity compared to those with medial laxity ( $p \leq 0.064$ ) at minimum 1-year follow up. KSS level walking pain, UCLA Activity level, KOOS JR total, and satisfaction scores were also superior for patients with symmetric or lateral laxity compared to those with medial laxity at 90-degrees although lacked statistical significance with numbers available ( $p \geq 0.111$ ).

**DISCUSSION AND CONCLUSION:** Results of this study suggest patients with either an equally tensioned rectangular flexion space, or with moderate later flexion laxity have superior clinical outcomes. These findings support the clinical benefit of facilitating posterolateral femoral rollback in flexion which mimics native knee kinematics and helps us further define targets for robotic and advanced technology.